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Conventional electron paramagnetic resonance of Mn^{2+} in synthetic hydroxyapatite at different concentrations of the doped manganese

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Abstract

© 2018 Institute of Physics Publishing. All rights reserved. Powders of synthetic hydroxyapatite doped with Mn2+ ions in concentrations from 0.05 till 5 wt. % were investigated by conventional electron paramagnetic resonance (EPR). The parameters of the spin-Hamiltonian are derived. Partially resolved hyperfine structure in the magnetic fields corresponding to g ≈ 4.3 and g ≈ 9.4 is observed. The narrowing of the central peak with concentration is reported. A possibility to use the linewidth and intensity of the central peak for concentration measurements are discussed. The results could be used for the identification and qualification of Mn2+ in oil, mining and ore formations.

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References

[1] Omelon S, Ariganello M, Bonucci E, Grynpas M and Nanci A 2013 Calcif. Tissue Int. 93 382
[2] Dong L, Zhu Z, Qiu Y and Zhao J 2016 Front. Environ. Sci. Eng. 10 28
[3] Chlala D, Giraudon J M, Nuns N, Lancelot C, Vannier R N, Labaki M and Lamonier J F 2016 Appl. Catal. B Environ. 184 87
[4] Khasanova N M, Gabdrakhmanov D T, Kayukova G P, Mikhaylova F N and Morozov V P 2017 Magn. Reson. Solids 19 17102
[5] Low J 1957 Phys. Rev. 105 793
[6] Gilinskaya L G and Sherbakova M Y 1971 J. Struct. Chem. 11 950
[7] Gilinskaya L G and Sherbakova M Y 1975 Isomorphous substitution and structural defects in apatites as found by EPR investigation (Novosibirsk: Publishing House "Nauka") 62 (in Russian)
[8] Mayer I, Diab H, Reinen D and Albrecht C 1993 J. Mater. Sci. 28 2428
[9] Mayer I, Jacobsohn O, Niazov T, Werckmann J, Iliescu M, Richard-Plouet M, Burghaus O and Reinen D 2003 Eur. J. Inorg. Chem. 7 1445
[10] Pan Y, Chen N, Weil J A and Nilges M J 2002 Amer. Miner. 87 1333
[11] Pon-On W, Meejoo S and Tang I 2008 Mater. Res. Bull. 43 2137
[12] Gafurov M, Biktagirov T, Mamin G, Klimashina E, Putlayev V, Kuznetsova L and Orlinskii S 2015 Phys. Chem. Chem. Phys. 17 20331
[13] Gafurov M R, Biktagirov T B, Mamin G V, Shurtakova D V, Klimashina E S, Putlyaev V I and Orlinskii S B 2016 Phys. Solid State 58 469
[14] Stich T A, Lahiri S, Yeagle G, Dicus M, Brynda M, Gunn A, Aznar C, DeRose V J and Britt R D 2007 Appl. Magn. Reson. 31 321
[15] Chelyshev Y, Gafurov M and Ignatyev I 2016 BioMed Res. Int. 2016 3706280

[16] Galukhin A V, Khelkhal M A, Gerasimov A V, Biktagirov T B, Gafurov M R, Rodionov A A and Orlinskii S B 2016 Energy Fuels 30 7731
[17] Stoll S and Schweiger A 2006 J. Magn. Reson. 178 42
[18] Klyava Y G 1988 EPR spectroscopy of disordered solids (Riga: Zinatne) 320 (in Russian)
[19] Aminov L K, Gafurov M R, Korableva S L et al 2017 Phys. Solid State 59 564
[20] Schreurs J W H 1978 Journ. Chem. Phys. 69 2151